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# Larval food plants of Australian Larentiinae (Lepidoptera: Geometridae) - a review of available data

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## Abstract

### Background

In Australia, the subfamily Larentiinae (Lepidoptera: Geometridae) comprises over 45 genera with about 270 species described so far. However, life histories of the Australian larentiine moths have barely been studied.

### New information

The current paper presents a list of larval food plants of 51 Australian larentiine species based on literature references, data from specimen labels and own observations. Some Australian habitats are shown. Possible relationships among the taxa based on food preference of the larvae are discussed. Additionally, a list of Australasian larentiine species from the genera occurring in Australia and their food plants is presented.

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## Keywords

Australasia, Australia, checklist, host plants, geometrid moths, larentiine moths

## Introduction

The immature stages and biology of the Australian Larentiinae (Lepidoptera, Geometridae) have received little attention in the past and our knowledge of host plant affiliations of the Australian species is remaining scarce. Hudson (1898) was one of the first researchers who discussed food plants of New Zealand larentiine larvae. Turner (1904), Common (1966) and Common (1990) presented some details of biology and listed a few food plants of Australian Larentiinae. McFarland (1979) published an annotated list of food plants of 280 Australian geometrid moths, including 16 larentiine species, whereby four species were identified to genus. He also succeeded to rear a large number of south Australian geometrid moths and completed 72 life history studies, but only four larentiine species were included (McFarland 1988). McQuillan (1986), McQuillan et al. (1998), McQuillan (1999) and McQuillan (2004) has been studying some aspects of biology, ecology and conservation of Australian moths focusing on the Tasmanian species. Holloway (1997) presented data on food plants of Indo-Australian Larentiinae. Some data on the larvae and food plants of the species *Anachloris* Meyrick, *Chaetolopha* Warren, *Scotocyma* Turner and *Visiana* Swinhoe are given in the reviews of these genera (Schmidt 2001, Schmidt 2002, Schmidt 2005, Schmidt 2006b, Schmidt 2007, Schmidt 2013.) Descriptions of larvae and pupae are incomplete or absent. Some observations on the eggs of Australian moths have been published by McFarland (1973). The first comprehensive review of the southern Australian geometrid eggs, including 18 larentiine species was completed by Young (2006), who also reared Tasmanian larvae of Geometridae, including several Larentiinae. Craw (1986) briefly described and illustrated a few New Zealand larentiine larvae. Totally, more than 270 larentiine species referred to about 45 genera are currently described from Australia. However, life histories of the vast majority of Australian larentiine moths remain unstudied.

## Materials and methods

The present report is based on literature references and personal observations. The following material has been used: *Anachloris uncinata* (Guenée) (Western Australia, Bremer Bay), *"Chloroclystis" approximata* (Walker) (New South Wales, Barren Grounds), *"Chloroclystis" insigillata* (Walker) (Queensland, Brisbane), *Epicyme rubropunctaria* (Doubleday) (New South Wales, Monga State Forest), *Epyaxa sodaliata* (Walker) (Queensland, Severnlea), *Gymnoscelis lophopus* Turner (Queensland, Brisbane), *Phrissogonus laticostata* (Walker) (Queensland, Brisbane), *Scotocyma albinotata* (Walker) (Queensland, Bunya Mountains), *Visiana brujata* (Guenée) (Queensland, Lamington National Park), *V. incertata* (Walker) (Queensland, Bunya Mountains). Additionally, data

were taken from labels of specimens deposited in the Australian National Insect Collection, CSIRO, Ecosystem Sciences, Canberra (ANIC).

Taxonomic affiliation for several species is questionable therefore several names are cited in quotation marks. Tribal association is only cited for the first member of the tribe in the section “Nomenclature”. In the section “Notes” the source of data on the food plants is presented. A list of Australian species of Larentiinae and their larval food plants is available under “Supplementary Materials” (see Suppl. material 1). A list of Australasian larentiine species from the genera occurring in Australia and their food plants is also presented (see Suppl. material 2).

## List of the Australian Larentiinae (Geometridae) and their food plants

### *Epicyme rubropunctaria* (Doubleday, 1843)

**Nomenclature:**

Tribe Asthenini

**Feeds on:** *Geranium* sp. (Geraniaceae)

**Notes:** Roberts 1979. However, a newly hatched larva refused to feed on flowers and leaves of *Geranium* sp. (Schmidt, unpubl. data).

Fig. 1.

Figure 1.

*Epicyme rubropunctaria*, female

Habitat of *E. rubropunctaria* is presented on Fig. 2.

Figure 2.

Habitat of *Epicyme rubropunctaria*, New South Wales, Monga State Forest

### *Epicyme rubropunctaria* (Doubleday, 1843)

**Feeds on:** *Haloragis alata* (Haloragaceae)

**Notes:** Hudson 1898.

### *Epicyme rubropunctaria* (Doubleday, 1843)

**Feeds on:** *Haloragis glauca* (Haloragaceae)

**Notes:** S. Williams, pers. comm., in: Marriott 2011.

### *Epicyme rubropunctaria* (Doubleday, 1843)

**Feeds on:** *Haloragis heterophylla* (Haloragaceae)

**Notes:** McFarland 1979.

### *Poecilasthena balioloma* (Turner, 1907)

**Feeds on:** *Leptospermum myrtifolium* (Myrtaceae)

**Notes:** McFarland 1979. Larvae of a New Zealand species *P. schistaria* (Walker, 1861) feed on *Leptospermum* sp. (Myrtaceae) (Hudson 1898).

***Poecilasthena ischnophrica* Turner, 1941**

**Feeds on:** *Leptospermum myrtifolium* (Myrtaceae)

**Notes:** McFarland 1979.

***Poecilasthena ischnophrica* Turner, 1941**

**Feeds on:** *Leptospermum myrsinoides* (Myrtaceae)

**Notes:** McFarland 1979.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Macropiper excelsum* (Piperaceae)

**Notes:** Hudson 1898.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Monotoca*? *scoparia* (Epacridaceae)

**Notes:** McQuillan 1986.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Monotoca glauca* (Epacridaceae)

**Notes:** C. Byrne, pers. comm., 2008.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Epacris* sp. (Epacridaceae)

**Notes:** McQuillan 1986.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Leucopogon juniperinus* (Epacridaceae)

**Notes:** McQuillan 1986.

***Poecilasthena pulchraria* (Doubleday, 1843)**

**Feeds on:** *Leptospermum scoparium* (Myrtaceae)

**Notes:** C. Byrne, pers. comm., 2008.

### *Poecilasthena pulchraria* (Doubleday, 1843)

**Feeds on:** *Astroloma humifusum* (Ericaceae)

**Notes:** McFarland 1979, McFarland 1988. Captured larvae were reared.

### *Poecilasthena pulchraria* (Doubleday, 1843)

**Feeds on:** *Brachyloma* sp. (Ericaceae)

**Notes:** Scoble 1999.

### *Poecilasthena xylocyma* (Meyrick, 1891)

**Feeds on:** *Leptospermum scoparium* (Myrtaceae)

**Notes:** ANIC label, C. Byrne, pers. comm., 2008.

### *Bosara minima* (Warren, 1897)

**Nomenclature:**

Tribe Eupitheciini

**Feeds on:** *Glochidion ferdinandi* (Euphorbiaceae)

**Notes:** Turner 1904. The plant species is described as *Phyllanthus ferdinandi*. An Indian larentiine species, *Bosara emarginaria* (Hampson, 1893) is known to feed on *Breynia* sp. (Euphorbiaceae) (P. Bell, pers. comm., in: Holloway 1997). The species *Bosara minima* was associated with the genera *Chloroclystis* Hübner and *Gymnoscelis* Mabille. The synonymy with *B. refusaria* Walker needs to be checked (see Holloway 1997).

### *"Chloroclystis" approximata* (Walker, 1869)

**Feeds on:** *Malus domestica* (Rosaceae)

**Notes:** Common 1990. Larvae occasionally damage the young fruits of apples.

Fig. 3.

Figure 3.

*Chloroclystis approximata*, female

Habitat of *C. approximata* is presented on Fig. 4.

Figure 4.

Habitat of *"Chloroclystis" approximata*, New South Wales, Barren Grounds

### *"Chloroclystis" approximata* (Walker, 1869)

**Feeds on:** *Prunus avium* (Rosaceae)

**Notes:** Common 1990. Larvae occasionally damage the young fruits of cherries.

### *"Chloroclystis" approximata* (Walker, 1869)

**Feeds on:** *Acacia terminalis* (Fabaceae)

**Notes:** Turner 1904, McQuillan 1986, Common 1990, Schmidt, unpubl. data. Larvae usually feed on the flowers of *Acacia* sp. The foodplant is known as *Acacia botrycephala*.

### *"Chloroclystis" catastreptes* (Meyrick, 1891)

**Feeds on:** *Bertya mitchellii* (Euphorbiaceae)

**Notes:** McFarland 1979. Larvae feed on flowers and flower buds of various unrelated plants.

### *"Chloroclystis" catastreptes* (Meyrick, 1891)

**Feeds on:** *Acacia* sp. (Fabaceae)

**Notes:** McFarland 1979, McQuillan 1986. Larvae feed on flowers and flower buds of various unrelated plants.

### *"Chloroclystis" catastreptes* (Meyrick, 1891)

**Feeds on:** *Clematis microphylla* (Ranunculaceae)

**Notes:** McFarland 1979. Larvae feed on flowers and flower buds of various unrelated plants.

### *"Chloroclystis" catastreptes* (Meyrick, 1891)

**Feeds on:** *Solidago* sp. (Asteraceae)

**Notes:** McFarland 1979, McQuillan 1986. Larvae feed on flowers and flower buds of various unrelated plants.

### *"Chloroclystis" filata* (Guenée, 1858)

**Feeds on:** *Pultenaea largiflorens var. latifolia* (Fabaceae)

**Notes:** McFarland 1979. Larvae feed on leaves and buds of the foodplant.

### *"Chloroclystis" filata* (Guenée, 1858)

**Feeds on:** *Hebe* sp. (Plantaginaceae)

**Notes:** White 1991.

### *"Chloroclystis" insigillata* (Walker, 1863)

**Feeds on:** *Macadamia* sp. (Proteaceae)

**Notes:** Common 1990. Larvae attack the flowers of *Macadamia* sp.

### *"Chloroclystis" insigillata* (Walker, 1863)

**Feeds on:** *Acacia* sp. (Fabaceae)

**Notes:** Common 1990, Schmidt, unpubl. data.

### *"Chloroclystis" insigillata* (Walker, 1863)

**Feeds on:** *Bertya* sp. (Euphorbiaceae)

**Notes:** Common 1990.

### *"Chloroclystis" insigillata* (Walker, 1863)

**Feeds on:** *Clematis* sp. (Ranunculaceae)

**Notes:** Common 1990, Schmidt, unpubl. data.

### *"Chloroclystis" insigillata* (Walker, 1863)

**Feeds on:** *Solidago* sp. (Asteraceae)

**Notes:** Common 1990.

### *Chloroclystis s.l.* sp.

**Feeds on:** Scrophulariaceae

**Notes:** McQuillan 1986.

### *Collix ghosha* (Walker, 1863)

**Feeds on:** *Ardisia* sp. (Primulaceae)

**Notes:** P. Bell, pers. comm., in: Holloway 1997, Tominaga 1998. Bell describes biology of *Collix ghosha*. The foodplant *Ardisia* sp. was in the former Myrsinaceae. A south-east Asian species *C. griseipalpis* Wileman, 1916 has been reared from *Allophylus* sp.

(Sapindaceae). A subspecies *C. g. phaeochiton* Prout, 1932 has been reared from *Ardisia* sp. and *Trigonostemon* sp. (Euphorbiaceae) (Prout 1932).

### *Collix ghosha* (Walker, 1863)

**Feeds on:** *Embelia* sp. (Primulaceae)

**Notes:** P. Bell, pers. comm., in: Holloway 1997, Tominaga 1998. Bell describes biology of *Collix ghosha*. The foodplant *Embelia* sp. was in the former Myrsinaceae.

### *Gymnoscelis delocyma* Turner, 1904

**Feeds on:** *Scyphiphora hydrophyllaceae* (Rubiaceae)

**Notes:** F.P. Dodd, pers. comm., in: Turner 1904. The larvae of the Malaysian species *Gymnoscelis pseudotibialis* Holloway, 1997 apparently feed on *Hevea* sp. (Euphorbiaceae) and *Mangifera* sp. (Anacardiaceae) (Yunus & Ho 1980, in: Holloway 1997).

### *Gymnoscelis derogata* (Walker, 1866)

**Feeds on:** *Macadamia* sp. (Proteaceae)

**Notes:** Zhang 1994. The species is known as *Gymnoscelis subrufata* Warren, 1898.

### *Gymnoscelis lophopus* Turner, 1904

Fig. 5.

Figure 5.

*Gymnoscelis lophopus*, female

**Feeds on:** *Acacia aulacocarpa* (Fabaceae)

**Notes:** Turner 1904, Common 1990. Larvae feed on the flowers of the foodplant.

Habitat of *Gymnoscelis lophopus* is presented on Fig. 6.

Figure 6.

Habitat of *Gymnoscelis lophopus*, Queensland, Brisbane

### *Gymnoscelis lophopus* Turner, 1904

**Feeds on:** *Lantana camara* (Verbenaceae)

**Notes:** Schmidt, unpubl. data. Larvae feed on the flowers of the foodplant.

### *Gymnoscelis lophopus* Turner, 1904

**Feeds on:** *Lantana* sp. (Verbenaceae)

**Notes:** Common 1990.

### *Gymnoscelis lophopus* Turner, 1904

**Feeds on:** *Macadamia* sp. (Proteaceae)

**Notes:** Common 1990. Larvae sometimes damage the flowers of *Macadamia* sp.

### *Gymnoscelis* sp.

**Feeds on:** *Pittosporum venulosum* (Pittosporaceae)

**Notes:** D. Herbison-Evans, pers. comm., 2015.

### *Microdes oriochares* Turner, 1922

**Feeds on:** *Olearia ramulosa* (Asteraceae)

**Notes:** McFarland 1979. Larvae feed on leaves of the foodplant.

### *Microdes squamulata* Guenée, 1858

**Feeds on:** *Acacia baileyana* (Fabaceae)

**Notes:** McFarland 1979.

### *Microdes squamulata* Guenée, 1858

**Feeds on:** *Acacia buxifolia* (Fabaceae)

**Notes:** McFarland 1979.

### *Microdes squamulata* Guenée, 1858

**Feeds on:** *Acacia dealbata* (Fabaceae)

**Notes:** McFarland 1979.

### *Microdes squamulata* Guenée, 1858

**Feeds on:** *Acacia decurrens* (Fabaceae)

**Notes:** Turner 1904.

### *Microdes squamulata* Guenée, 1858

**Feeds on:** *Acacia mearnsii* (Fabaceae)

**Notes:** McFarland 1979.

### *Microdes villosata* Guenée, 1858

**Feeds on:** *Acacia* sp. (Fabaceae)

**Notes:** McQuillan 1999.

### *Pasiphila testulata* (Guenée, 1858)

**Feeds on:** *Malus domestica* (Rosaceae)

**Notes:** Common 1990. Larvae occasionally damage the young fruits of apples. Three Europaean species, *P. chloerata* (Mabille, 1870), *P. debiliata* (Hübner, 1817) and *P. rectangulata* (Linnaeus, 1758) feed on *Prunus* spp. (Rosaceae), *Vaccinium* spp. (Ericaceae) and *Malus* sp., *Pyrus* sp., *Prunus* spp., *Crataegus* sp. and *Amelanchier* sp. (Rosaceae) (Mironov 2003). A New Zealand species *P. urticae* (Hudson, 1939) feed on *Urtica ferox* (Urticaceae).

### *Pasiphila testulata* (Guenée, 1858)

**Feeds on:** *Prunus avium* (Rosaceae)

**Notes:** Common 1990. Larvae occasionally damage the young fruits of cherries. *P. testulata* is known as *Chloroclystis testulata* (Guenée).

### *Pasiphila testulata* (Guenée, 1858)

**Feeds on:** *Acacia terminalis* (Fabaceae)

**Notes:** Common 1990, Schmidt, unpubl. data, C. Byrne, pers. comm., 2008. Larvae usually feed on the flowers of *Acacia* sp. The foodplant is known as *Acacia botrycephala*.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Acacia* sp. (Fabaceae)

**Notes:** Common 1990. Larvae usually feed on the flower buds and flowers of *Acacia*.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Clematis* sp. (Ranunculaceae)

**Notes:** Common 1990. Larvae can damage the foliage of the foodplant.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Cosmos* sp. (Asteraceae)

**Notes:** Schmidt, unpubl. data. Larvae readily accepted flowers of *Cosmos* sp. from a garden in Brisbane.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Helianthus annuus* (Asteraceae)

**Notes:** Common 1990. Larvae can damage the foliage of the foodplant.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Hypericum* sp. (Hypericaceae)

**Notes:** Common 1990. Larvae can damage the foliage of the foodplant.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Malus domestica* (Rosaceae)

**Notes:** Common 1990. Larvae can damage the foliage of the foodplant.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Medicago sativa* (Fabaceae)

**Notes:** Zhang 1994.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Prunus avium* (Rosaceae)

**Notes:** Zhang 1994.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Prunus cerasus* (Rosaceae)

**Notes:** Zhang 1994.

### *Phrissogonus laticostata* (Walker, 1863)

**Feeds on:** *Rosa odorata* (Rosaceae)

**Notes:** D. Herbison-Evans, pers. comm., 2015. Captured larvae readily accepted the flower petals from *Rosa* sp.

### *Symmimetis* sp.

**Feeds on:** *Aglaia* sp. (Meliaceae)

**Notes:** Holloway 1997.

### *Sauris cirrhigera* (Warren, 1897)

**Nomenclature:**

Tribe Trichopterygini

**Feeds on:** *Cinnamomum* sp. (Lauraceae)

**Notes:** Dugdale 1980. One specimen of the Indo-Pacific species *Sauris eupitheciata* (Snellen, 1881) was reared from the folliage of *Loranthus* sp. (Loranthaceae) (Holloway 1997), of *Sauris hirudinata* Guenée, 1858 from *Alseodaphne* sp. (Lauraceae) and *Lagerstroemia* sp. (Lythraceae) (P. Bell, pers. comm., in: Holloway 1997), of *Sauris interruptata* (Moore, 1888) on *Cinnamomum* sp. (Lauraceae) Holloway 1997), and of one species occurring on Niue Island on *Ficus prolixa* (Moraceae) (Dugdale 1980).

### *Sauris commoni* Dugdale, 1980

**Feeds on:** *Exocarpos latifolius* (Santalaceae)

**Notes:** ANIC label. One larva was beaten from *Exocarpos latifolia*.

### *Sauris malaca* (Meyrick, 1891)

**Feeds on:** *Litchi chinensis* (Sapindaceae)

**Notes:** Dugdale 1980, Common 1990. Larvae have been reported feeding on the young foliage of *Litchi* sp.

### *Sauris malaca* (Meyrick, 1891)

**Feeds on:** *Toona ciliata* (Meliaceae)

**Notes:** Dugdale 1980, Common 1990. Larvae have been reported feeding on the young foliage of *Toona* sp. The foodplant is known as *Toona australis*.

### *Tympanota perophora* (Turner, 1922)

**Feeds on:** *Podocarpus lawrencei* (Podocarpaceae)

**Notes:** ANIC label, Dugdale 1980. The species has been reared by I.F.B. Common (ANIC).

### *Acodia* sp.

**Nomenclature:**

Tribe Xanthorhoini

**Feeds on:** *Coprosma* sp. (Rubiaceae)

**Notes:** McQuillan 1999, McQuillan 2004.

### *Austrocidaria* sp.

**Feeds on:** *Coprosma* sp. (Rubiaceae)

**Notes:** Hudson 1898, Dugdale 1964, Dugdale 1988, McQuillan 1999, McQuillan 2004. One New Zealand species feeds on *Myrsine* sp. and *Rapanea crassifolia* (Myrsinaceae) (Dugdale 1971).

### *Chrysolarentia decisaria* (Walker, 1863)

**Feeds on:** *Pelargonium rodneyanum* (Geraniaceae)

**Notes:** McFarland 1979, McFarland 1988, C. Byrne, pers. comm., 2008.

### *Chrysolarentia decisaria* (Walker, 1863)

**Feeds on:** *Ranunculus prasinus* (Ranunculaceae)

**Notes:** McFarland 1979, McFarland 1988, C. Byrne, pers. comm., 2008.

### *Chrysolarentia insulsata* (Guenée, 1858)

**Feeds on:** *Plantago lanceolata* (Plantaginaceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia lucidulata* (Walker, 1963)

**Feeds on:** *Plantago lanceolata* (Plantaginaceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Hibbertia* sp. (Dilleniaceae)

**Notes:** McFarland 1979McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Lythrum* sp. (Lythraceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Malva* sp. (Malvaceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Mentha* sp. (Lamiaceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Polygonum* sp. (Polygonaceae)

**Notes:** McFarland 1979, McFarland 1988.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Centaurium* sp. (Gentianaceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Chenopodium* sp. (Chenopodiaceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Medicago* sp. (Fabaceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Plantago* sp. (Plantaginaceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Solidago* sp. (Asteraceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Chrysolarentia vicissata* (Guenée, 1858)

**Feeds on:** *Stellaria* sp. (Caryophyllaceae)

**Notes:** McFarland 1979, McFarland 1988. Larvae were feeding on introduced weeds in capture.

### *Epyaxa sodaliata* (Walker, 1963)

Fig. 7.

Figure 7.

*Epyaxa sodaliata*, female

**Feeds on:** *Anagallis arvensis* (Primulaceae)

**Notes:** McFarland 1979. Larvae readily accepted leaves and buds of *Anagallis arvensis* but refused to feed on *Plantago*. A New Zealand species *E. rosearia* (Doubleday, 1843) feeds on *Nasturtium officinale* (Brassicaceae) (Hudson 1898).

Habitat of *Epyaxa sodaliata* is presented on Fig. 8.

Figure 8.

*Habitat of Epyaxa sodaliata*, Queensland, Severnlea

### *Epyaxa sodaliata* (Walker, 1963)

**Feeds on:** *Primula* sp. (Primulaceae)

**Notes:** Schmidt, unpubl. data. Larvae were feeding on *Primula* sp. from a garden in Brisbane.

### *Epyaxa sodaliata* (Walker, 1963)

**Feeds on:** *Myosotis arvensis* (Boraginaceae)

**Notes:** D. Herbison-Evans, pers. comm., 2015.

### *Epyaxa subidaria* (Guenée, 1858)

**Feeds on:** *Medicago polymorpha* var. vulgaris (Fabaceae)

**Notes:** McFarland (1979), Schmidt, unpubl. data. Captured larvae were reared.

### *Epyaxa subidaria* (Guenée, 1858)

**Feeds on:** *Hydrocotyle sibthorpioides* (Araliaceae)

**Notes:** McQuillan (1999). Captured larvae were reared to the final instar.

### *Epyaxa subidaria* (Guenée, 1858)

**Feeds on:** *Plantago lanceolata* (Plantaginaceae)

**Notes:** McQuillan (2004). One New Zealand *Epyaxa* species is known to feed on *Rumex* sp. (Polygonaceae) and *Tropaeolum majus* (Tropaeolaceae) (White 1991).

### *Scotocyma albinotata* (Walker, 1866)

**Feeds on:** *Coprosma repens* (Rubiaceae)

**Notes:** Schmidt (2003), Schmidt (2005), Schmidt (2006a), Schmidt (2007).

Fig. 9.

Figure 9.

*Scotocyma albinotata*, female

Habitat of *Scotocyma albinotata* is presented on Fig. 10.

Figure 10.

Habitat of *Scotocyma albinotata*, Queensland, Bunya Mountains

### *Xanthorhoe vacuaria* (Guenée, 1858)

**Feeds on:** *Medicago polymorpha* var. vulgaris (Fabaceae)

**Notes:** McFarland (1979), McFarland (1988). Captured larvae were reared. Malaysian *Xanthorhoe liwagu* Holloway, 1997 were feeding on *Brassica* sp. (Cruciferae) and *Mentha* sp. (Labiatae) (Yunus and Ho 1980, Singh 1953, in: Holloway 1997).

### *Anachloris subochraria* (Doubleday)

**Nomenclature:**

Unplaced to tribe

**Feeds on:** *Epilobium*? *ciliatum* (Onagraceae)

**Notes:** S. Williams, unpubl. data.

### *Anachloris tofocolorata* Schmidt, 2001

**Feeds on:** *Hibbertia virgata* (Dilleniaceae)

**Notes:** McFarland (1979), Schmidt (2001).

### *Anachloris uncinata* (Guenée)

**Feeds on:** *Hibbertia obtusifolia* (Dilleniaceae)

**Notes:** Common (1966), McFarland (1979), Schmidt (2001).

Fig. 11.

Figure 11.

*Anachloris uncinata*, male

Habitat of *A. uncinata* is presented on Fig. 12.

Figure 12.

Habitat of *Anachloris uncinata*, Western Australia, Stirling Range

## *Anachloris uncinata* (Guenée)

**Feeds on:** *Hibbertia riparia* (Dilleniaceae)

**Notes:** S. Williams, unpubl. data.

### *Anachloris uncinata* (Guenée, 1858)

**Feeds on:** *Hibbertia stricta* (Dilleniaceae)

**Notes:** McFarland (1979), Schmidt (2001).

### *Chaetolopha emporias* (Turner, 1904)

**Feeds on:** *Pteridium esculentum* (Polypodiaceae)

**Notes:** ANIC label, Schmidt (2002). In ANIC there is a specimen with a label written by I.F.B. Common, “Larvae eat bracken fern".

### *"Chrysolarentia" actinipha* (Lower, 1902)

**Feeds on:** *Medicago polymorpha* var. vulgaris (Fabaceae)

**Notes:** McFarland (1979), McFarland (1988).

### *"Chrysolarentia" leucophanes* (Meyrick, 1891)

**Feeds on:** *Leptospermum scoparium* (Myrtaceae)

**Notes:** C. Byrne, pers. comm., 2008.

### *"Chrysolarentia" leucophanes* (Meyrick, 1891)

**Feeds on:** *Melaleuca squamea* (Myrtaceae)

**Notes:** C. Byrne, pers. comm., 2008.

### *"Chrysolarentia" leucophanes* (Meyrick, 1891)

**Feeds on:** *Monotoca glauca* (Epacridaceae)

**Notes:** C. Byrne, pers. comm., 2008.

### *"Chrysolarentia" severata* (Guenée, 1858)

**Feeds on:** *Astroloma humifusum* (Ericaceae)

**Notes:** S. Williams, pers. comm., in: Marriott (2011).

### *"Chrysolarentia"* sp. nr. *severata*

**Feeds on:** *Leptospermum scoparium* (Myrtaceae)

**Notes:** C. Byrne, pers. comm., 2016. The species is recorded as *"Euphyia"* nr. *severata* . The collection details are: Cape Bruny, Tasmania, 28/10/99, C. Byrne.

### *"Chrysolarentia" squamulata* (Warren, 1899)

**Feeds on:** *Olearia ramulosa* (Asteraceae)

**Notes:** McFarland (1979).

### *Heterohasta conglobata* (Walker, 1963)

**Feeds on:** *Hibbertia scandens* (Dilleniaceae)

**Notes:** ANIC label. Larvae feed on leaves and shoots of *Hibbertia scandens*.

### *Melitulias* sp.

**Feeds on:** Fabaceae

**Notes:** McQuillan (1986).

### *Melitulias* s.l. sp. undescribed

**Feeds on:** *Casuarina paludosa* var. robusta (Casuarinaceae)

**Notes:** McFarland (1988). The species cited as "*Horisme*" sp.? has been reared. The specimen apparently represents an undescribed species (Schmidt, unpubl. data).

### *Polyclysta hypogrammata* Guenée, 1858

**Feeds on:** *Ficus* sp. (Moraceae)

**Notes:** Turner (1904).

### *Visiana brujata* (Guenée, 1858)

**Feeds on:** *Urtica incisa* (Urticaceae)

**Notes:** ANIC label, Schmidt (2006b), Schmidt (2013). Larvae were reared from eggs.

## *Visiana incertata* (Walker, 1862)

**Feeds on:** *Urtica incisa* (Urticaceae)

**Notes:** Schmidt, unpubl. data. Larvae were reared from eggs.

Fig. 13.

Figure 13.

*Visiana incertata*, female

Habitat of *Visiana incertata* is presented on Fig. 14.

Figure 14.

Habitat of *Visiana incertata*, Bunya Mountains

### *Visiana incertata* (Walker, 1862)

**Feeds on:** *Urtica dioica* (Urticaceae)

**Notes:** Schmidt, unpubl. data. Final instar larvae readily accepted the leaves of *Urtica dioica* (flowers and buds were not offered).

## Discussion

Larval food plants of 51 Australian larentiine species from the following tribes are presented, including Asthenini (5 species), Eupitheciini (17 species), Trichopterygini (4 species) and Xanthorhoini (10 species). Additionally, food plants of 15 species unplaced to tribe are listed. The larvae are recorded to feed on 36 plant families (Table 1). More than a half of plant species are native to Australia. Two species, namely *Lantana camara* (Verbenaceae) and *Acacia mearnsii* (Fabaceae) are recorded as invasive species.

Table 1.

Families of the larval food plants of Australian Larentiinae

| No | Food plant | Tribe | Species |
|---|---|---|---|
| 1 | Araliaceae | Xanthorhoini | *Epyaxa subidaria* |
| 2 | Asteraceae | Eupitheciini | *"Chloroclystis" catastreptes* |
| 2 | Asteraceae | Eupitheciini | *"Chloroclystis" insigillata* |
| 2 | Asteraceae | Eupitheciini | *Microdes oriochares* |
| 2 | Asteraceae | Eupitheciini | *Phrissogonus laticostata* |
| 2 | Asteraceae | Eupitheciini | *Chrysolarentia vicissata* |
| 2 | Asteraceae | Unplaced to tribe | *"Chrysolarentia" squamulata* |
| 3 | Boraginaceae | Xanthorhoini | *Epyaxa sodaliata* |
| 4 | Caryophyllaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 5 | Chenopodiaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 6 | Dilleniaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 6 | Dilleniaceae | Unplaced to tribe | *Anachloris tofocolorata* |
| 6 | Dilleniaceae | Unplaced to tribe | *Anachloris uncinata* |
| 6 | Dilleniaceae | Unplaced to tribe | *Heterohasta conglobata* |
| 7 | Epacridaceae | Asthenini | *Poecilasthena pulchraria* |
| 7 | Epacridaceae | Unplaced to tribe | *"Chrysolarentia" leucophanes* |
| 8 | Ericaceae | Asthenini | *Poecilasthena pulchraria* |
| 8 | Ericaceae | Asthenini | *Phrissogonus laticostata* |
| 8 | Ericaceae | Unplaced to tribe | *"Chrysolarentia" severata* |
| 9 | Euphorbiaceae | Eupitheciini | *Bosara minima* |

| | | | |
|---|---|---|---|
| 9 | Euphorbiaceae | Eupitheciini | *"Chloroclystis" catastreptes* |
| 9 | Euphorbiaceae | Eupitheciini | *"Chloroclystis" insigillata* |
| 10 | Fabaceae | Eupitheciini | *"Chloroclystis" approximata* |
| 10 | Fabaceae | Eupitheciini | *"Chloroclystis" catastreptes* |
| 10 | Fabaceae | Eupitheciini | *"Chloroclystis" filata* |
| 10 | Fabaceae | Eupitheciini | *"Chloroclystis" insigillata* |
| 10 | Fabaceae | Eupitheciini | *Gymnoscelis lophopus* |
| 10 | Fabaceae | Eupitheciini | *Microdes squamulata* |
| 10 | Fabaceae | Eupitheciini | *Microdes villosata* |
| 10 | Fabaceae | Eupitheciini | *Pasiphila testulata* |
| 10 | Fabaceae | Eupitheciini | *Phrissogonus laticostata* |
| 10 | Fabaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 10 | Fabaceae | Xanthorhoini | *Epyaxa subidaria* |
| 10 | Fabaceae | Xanthorhoini | *Xanthorhoe vacuaria* |
| 10 | Fabaceae | Unplaced to tribe | *"Chrysolarentia" actinipha* |
| 10 | Fabaceae | Unplaced to tribe | *Melitulias* sp. |
| 11 | Gentianaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 12 | Geraniaceae | Asthenini | *Epicyme rubropunctaria* |
| 12 | Geraniaceae | Xanthorhoini | *Chrysolarentia decisaria* |
| 13 | Haloragaceae | Asthenini | *Epicyme rubropunctaria* |
| 14 | Lauraceae | Trichopterygini | *Sauris cirrhigera* |
| 15 | Lamiaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 16 | Lythraceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 17 | Malvaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 18 | Meliaceae | Eupitheciini | *Symmimetis* sp. |
| 18 | Meliaceae | Trichopterygini | *Sauris malaca* |
| 19 | Moraceae | Unplaced to tribe | *Polyclysta hypogrammata* |
| 20 | Myrtaceae | Asthenini | *Poecilasthena balioloma* |
| 20 | Myrtaceae | Asthenini | *Poecilasthena ischnophrica* |
| 20 | Myrtaceae | Asthenini | *Poecilasthena pulchraria* |
| 20 | Myrtaceae | Asthenini | *Poecilasthena xylocyma* |
| 20 | Myrtaceae | Unplaced to tribe | *"Chrysolarentia" leucophanes* |
| 21 | Onagraceae | Unplaced to tribe | *Anachloris subochraria* |
| 22 | Piperaceae | Asthenini | *Poecilasthena pulchraria* |
| 23 | Pittosporaceae | Eupitheciini | *Gymnoscelis* sp. |
| 24 | Plantaginaceae | Eupitheciini | *"Chloroclystis" filata* |
| 24 | Plantaginaceae | Xanthorhoini | *Chrysolarentia insulsata* |

| | | | |
|---|---|---|---|
| 24 | Plantaginaceae | Xanthorhoini | *Chrysolarentia lucidulata* |
| 24 | Plantaginaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 24 | Plantaginaceae | Xanthorhoini | *Epyaxa subidaria* |
| 25 | Podocarpaceae | Trichopterygini | *Tympanota perophora* |
| 26 | Polygonaceae | Xanthorhoini | *Chrysolarentia vicissata* |
| 27 | Primulaceae | Eupitheciini | *Collix ghosha* |
| 27 | Primulaceae | Eupitheciini | *Epyaxa sodaliata* |
| 28 | Proteaceae | Eupitheciini | *"Chloroclystis" insigillata* |
| 28 | Proteaceae | Eupitheciini | *Gymnoscelis lophopus* |
| 28 | Proteaceae | Eupitheciini | *Gymnoscelis derogata* |
| 29 | Ranunculaceae | Eupitheciini | *"Chloroclystis" catastreptes* |
| 29 | Ranunculaceae | Eupitheciini | *"Chloroclystis" insigillata* |
| 29 | Ranunculaceae | Eupitheciini | *Phrissogonus laticostata* |
| 29 | Ranunculaceae | Xanthorhoini | *Chrysolarentia decisaria* |
| 30 | Rosaceae | Eupitheciini | *"Chloroclystis" approximata* |
| 30 | Rosaceae | Eupitheciini | *Pasiphila testulata* |
| 30 | Rosaceae | Eupitheciini | *Phrissogonus laticostata* |
| 31 | Rubiaceae | Eupitheciini | *Gymnoscelis delocyma* |
| 31 | Rubiaceae | Xanthorhoini | *Acodia* sp. |
| 31 | Rubiaceae | Xanthorhoini | *Austrocidaria* sp. |
| 31 | Rubiaceae | Xanthorhoini | *Scotocyma albinotata* |
| 32 | Santalaceae | Trichopterygini | *Sauris commoni* |
| 33 | Sapindaceae | Trichopterygini | *Sauris malaca* |
| 34 | Scrophulariaceae | Eupitheciini | *Chloroclystis s.l. sp.* |
| 35 | Urticaceae | Unplaced to tribe | *Visiana brujata* |
| 35 | Urticaceae | Unplaced to tribe | *Visiana incertata* |
| 36 | Verbenaceae | Eupitheciini | *Gymnoscelis lophopus* |

*"Chloroclystis" approximata*, *"C." insigillata*, *Gymnoscelis lophopus*, *G. derogata*, *Pasiphila testulata*, *Phrissogonus laticostata* and *Sauris malaca* are known as minor pests of cultivated plants.

The food plants are recorded for about 20% of Australian species therefore conclusions about food preference are rather preliminary. Moreover, the larentiine larvae are often polyphagous, hence the assumptions that taxa are closely related based solely on food preference of the larvae should not be overestimated.

## Tribes Asthenini and Eupitheciini

Like in the Palaearctic region, larvae of Australian species of the tribe Eupitheciini are mostly polyphagous or oligophagous, tending to feed on flowers and buds of various plants. The tribes Eupitheciini and Asthenini are often considered closely related (*e.g.* Xue and Scoble 2002). Holloway (1997) treated the 'asthenine' genera in Eupitheciini, although he mentioned that *Poecilasthena* Warren, *Parasthena* Warren, *Eois* Hübner, *Polynesia* Swinhoe and *Pseudopolynesia* Holloway could be placed in Ashtenini. The present study revealed no evidence of concordance of the data on food preference of the larvae of these two tribes. The asthenine larvae mainly feed on leaves of native Epacridaceae, Ericaceae, Haloragaceae and Myrtaceae, with one species feeding on Piperaceae, whereas the larvae of Eupitheciini prefer feeding on the flowers and buds of Asteraceae, Euphorbiaceae, Fabaceae, Hypericaceae, Pittosporaceae, Plantaginaceae, Primulaceae, Proteaceae, Ranunculaceae, Rosaceae, Rubiaceae, Verbenaceae and occasionally on Meliaceae and Menispermaceae. The tribe Asthenini seems to be distinct from Eupitheciini, however, additional data need to be collected and analysed to clarify placement of several genera currently included in these tribes.

## Tribe Trichopterygini

Food plants are recognized for several Indo-Pacific and South American species of the genera occurring in Australia. Larvae of one Japanese species of *Episteira* Warren from the tribe Trichopterygini feed on foliage of trees or shrubs of *Podocarpus* sp. (Podocarpaceae) (Sugi, 1987, in: Holloway 1997), like Australian trichopterygine species of *Tympanota*. Generally, the Australian trichopterygines are associated with Lauraceae, Meliaceae, Santalaceae and Sapindaceae. In Europe, larvae of Trichopterygini are associated with trees and shrubs from the families Anacardiaceae, Cupressaceae, Salicaceae and Sapindaceae, with a few polyphagous species feeding on Aquifoliaceae, Araliaceae, Caprifoliaceae, Cornaceae, Ranunculaceae, Rhamnaceae and Rosaceae (see Hausmann and Viidalepp 2012). Most of the trichopterygine food plants belong to the Sapindales in both Europe and Australasia.

## Tribe Xanthorhoini

Like in the Palaearctic region, larvae of Australian xanthorhoines are polyphagous, feeding mainly on foliage of flowering plants and herbs. Most of the Australian larvae accepted Plantaginaceae, Fabaceae and Rubiaceae.

## Genera unplaced to tribes

Larvae of a New Zealand species *Aponotoreas dissimilis* (Philpott, 1914) accepted *Dracophyllum* sp. (Epacridaceae), whereas *A. synclinalis* (Hudson, 1903) was feeding on *Empodisma minus* (Restionaceae) (B. Patrick, pers. comm., in: Craw 1986). The genus *Aponotoreas* Craw is currently assigned to the tribe Hydriomenini (McQuillan and Edwards 1996) but does not share several morphological characters of the tribe and is in need of

taxonomic study (Schmidt, unpubl. data). Epacridaceae is a food plant of several asthenine species and of *Chrysolarentia leucophanes* of which the tribal assignment is still unclear. Apart from *A. synclinalis*, no further larentiine larvae are known to feed on Restionaceae. In Europe, the larvae of *Hydriomena* spp. are known to feed on Betulaceae, Corylaceae, Ericaceae, Fagaceae and Salicaceae (see Hausmann and Viidalepp 2012). Regarding the larval food preference of *Aponotoreas*, there is no indication of a close affinity with Hydriomenini.

Larvae of an Indo-Pacific species *Eois grataria* (Walker, 1861) feed on *Mallotus* sp. (Euphorbiaceae) (Singh, 1953, in: Holloway 1997), while most of South American species of the genus readily accept *Piper* sp. (Piperaceae) (Strutzenberger and Fiedler 2011). *Eois* Hübner is not assigned to any tribe currently although it has been cited in Asthenini and Eupitheciini, or excluded from both tribes (Holloway 1997, Xue and Scoble 2002, Strutzenberger and Fiedler 2011, Viidalepp 2011). *Glochidion* sp., *Bertya* sp., *Trigonostemon* sp., *Hevea* sp. (Euphorbiaceae) are food plants of the Indo-Australian eupitheciine larvae, which would indicate an affinity of *Eois* with Eupitheciini. However, larvae of one asthenine species feed on Piperaceae, like *Poecilasthena pulchraria* (Doubleday, 1843) that is placed in Asthenini. Adult morphological characters indicate a close relationship of the Australasian *Eois* to Eupitheciini (Schmidt, unpubl. data).

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# Supplementary materials

## Suppl. material 1: List of the Australian Larentiinae (Geometridae) and their food plants

**Authors:** O. Schmidt
**Data type:** food plants
**Filename:** Australian_Larentiinae_Foodplants_BDJ.xls - Download file (156.00 kb)

## Suppl. material 2: List of the Australasian Larentiinae (Geometridae) and their food plants

**Authors:** O. Schmidt
**Data type:** food plants
**Filename:** Australasian_Larentiinae_Foodplants_BDJ.xls - Download file (134.50 kb)